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BIENNIAL REPORT

1967-1969

COUNTY OF LOS ANGELES
DEPARTMENT OF ARBORETA
AND BOTANIC GARDENS

ARBORETUM

DESCANSO GARDENS

SOUTH COAST BOTANIC GARDEN

Compiled and edited
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Gentlemen:

It is a pleasure to submit this report on the activities of this Department for the period of 1967 – 1969.

There has been much progress in the development of the Department's three major facilities: the Arboretum, Descanso Gardens, and the South Coast Botanic Garden, as well as its three facilities of secondary importance: the 150 acre Lux Arboretum in Monrovia, the Palmdale Test Plot, and the Antelope Valley Test Station.

Especially notable developments have been: construction of the Research Laboratory Building, the Meyberg Memorial Waterfall, and relocation of the historic Santa Fe Santa Anita Depot at the Arboretum; construction of a Japanese gift shop at Descanso Gardens, and construction of the public rest rooms at South Coast Botanic Garden.

In addition, public attendance at the Department's facilities has reached a new high, averaging over 2,000,000 for the past two years.

These accomplishments have been the result of the combined efforts of many people: the staff, the Board of Governors, private citizen supporting groups – especially the California Arboretum Foundation, the Descanso Gardens Guild, and the South Coast Botanic Garden Foundation – and numerous service departments within the County.

As Director I particularly appreciate the excellent work of all these groups and to them express my appreciation.

Respectfully submitted,

William S. Stewart
Director

WSS:jd

Los Angeles State and County Arboretum
Arcadia

Descanso Gardens
La Canada

South Coast Botanic Garden
Palos Verdes Peninsula

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ARBORETUM

With Mrs. Manfred Meyberg in attendance, the Manfred Meyberg Waterfall was dedicated on November 23, 1969. Constructed with funds donated by Mrs. Meyberg who chose this landscape attraction to serve as a memorial to her late husband and his many good works on behalf of the horticultural beautification of Los Angeles, the waterfall starts in a tropical garden atop Tallac Knoll and cascades at the rate of 48,000 gallons of water per hour to a pool below. The central fall drops twenty feet.

For the landscape around the watercourse, ground covers and shrubs were chosen that would provide year round color against a green background mixed with a spray of white water.

ARBORETUM

ATTENDANCE

Despite the heavy winter rains of 1969 (see WEATHER), attendance at the Arboretum passed the one-million mark in this biennium.

1965-66		1966-67	1967-68		1968-69
484,594		511,674	543,124		538,586
	996,268			1,081,710	

MULCHING

To date, over 700,000 square feet of areas planted to trees and shrubs have been mulched in accord with a program started in the previous biennium. Prior to this program lawns were of prime importance with consequent cultural practices not favorable for the growth of trees and shrubs.

Mulching provides for:

a. better root systems
b. proper irrigation methods
c. more meaningful fertilizing program
d. cooler ground temperatures in the summer and warmer ground temperatures in the winter
e. conservation of soil moisture
f. increase in soil biological activity
g. increase in soil fertility
h. greater moisture absorption, infiltration, and percolation

JUNGLE

700 feet of raised paths consisting of decomposed granite were constructed in the "jungle" area bordering the largest of the spring-fed lakes. This was done to provide visitors dry footing through this normally wet area and to minimize accidents to youngsters who tramp through heavy growth creating unwanted trails.

FREEWAY DEVELOPMENT

The Arboretum lost approximately one acre of land to the construction of an exit

ramp to Colorado Boulevard from the new extension of the Foothill Freeway. This required the relocation of a lath house and the nursery area and moving upwards of 5,000 container plants several times.

PLANT INTRODUCTION

The Arboretum's plant introduction program stems from its worldwide seed exchange program, and from its genetic research in the development of new horticultural hybrids. (See RESEARCH DIVISION – Plant Records)

The following plants were introduced to the nursery trade in this biennium:

a. *Hibiscus 'William Stewart'*
b. *Hibiscus 'LASCA Beauty'*
c. *Hibiscus 'Myella'*

These lovely flowers were developed through the Arboretum's hibiscus research project led by research associate, Ross Gast.

d. *Osteospermum fruticosum* 'Burgundy Mound', a dark color selection from an original planting of cuttings obtained from South Africa.
e. *Harpullia arborea* – a native of southeast Pacific areas.
f. *Viburnum macrocephalum* – a native of China widely grown in eastern United States. Plants were growing on the original Rancho Santa Anita homesite now occupied by the Arboretum.
g. *Hibiscus huegelii* – native to Australia, seeds were originally obtained from Perth, Australia.
h. *Arthrostylidium longifolium* – native to Mexico, original plants were obtained from the U. S. Plant Introduction Station in Florida.
i. *Pittosporum napaulense* – native to the Himalayas, original plants obtained in 1951 from Dr. Lux (Lux Arboretum) who many years previously had obtained seed from the U. S. Department of Agriculture.

JUNIPER DISPLAY AREA

Although junipers are more widely used for landscaping in Southern California than any other woody plant, an adequate display of the numerous varieties has been notably lacking. To remedy this situation, a juniper display area was started in mid-1968 in a

location just north of the library building. Set off by a low, 250-foot broken concrete wall, the area was initially planted with 60 selections of ground cover and columnar types.

BERTHOLET GLADE

Funds donated by the Santa Anita Highlands Garden Club made possible the construction of the memorial Bertholet Glade adjacent to the Meyberg Waterfall.

RESEARCH LABORATORY BUILDING

Acting on a recommendation made in 1966 by the County Grand Jury, the Board of Supervisors awarded a contract for the construction of an 8,190-square-foot research building to house laboratories, offices, and other services required by the department's Research Division. Construction began October 14, 1968; completion is scheduled for the spring of 1970.

SANTA ANITA DEPOT

On February 19, 1969, County Supervisor Frank Bonelli and Arcadia Mayor Donald Hage lent their official presence to a ground-breaking ceremony in the Arboretum's south parking lot, a ceremony culminating a save-the-Santa Anita-Depot-drive conducted by the Arcadia Historical Society and numerous civic leaders. The historic depot, built in 1890 by E. J. "Lucky" Baldwin and closed in 1940, was dismantled in its original location on Colorado Boulevard and Old Ranch Road, and the bricks and other materials transferred to the new location for use in the reconstruction. Completion is scheduled for the summer of 1970.

DESCANSO GARDENS

ATTENDANCE

Attendance fell short of the one-million mark in this biennium because of the extremely wet winter in 1969 (see WEATHER).

1965-66	1966-67	1967-68	1968-69
437,651	465,927	500,104	391,119
903,578		891,223	

DESCANSO GARDENS

BUILDINGS

A bird observation station, located in the children's education area, was built jointly by the San Fernando Audubon Society and the County of Los Angeles.

A Japanese gift shop, the "Minka," was under construction in the Japanese Garden area. When completed it will be donated to the County by Robert Kawashima.

HISTORICAL AREA

Through the efforts of the Descano Gardens Guild, Descano Gardens has been designated a California State Historical Monument in recognition of its colorful history and the days when the land was under Spanish and Mexican rule.

THE MINKA

SPECIAL EVENTS

In addition to the well-attended camellia, daffodil, bonsai, chrysanthemum, and rose shows held annually, the biannual Festival of Gardens, Lights, and Fountains, sponsored by the Descano Gardens Guild, was an outstanding success, attracting 107,000 visitors during its five-week run that started July 1, 1967.

TREE PLANTING

New plantings in the redwood section increased the number of trees to 200.

RESEARCH

A test garden for camellias from all parts of the world was established by the Los Angeles Camellia Council, Ltd.

WEATHER

The heavy rains and floods of January and February, 1969, caused extensive damage to the native plant section, streams, camellia plantings, roads, and canyon water systems. Estimated cost of repair: $40,000.

DONATIONS

The gardens received a cymbidium orchid collection valued at $2,000; a gift of $180 for purchase of trees in honor of Lyman Fay Barber; a giant, thirty-five-year-old orchid tree (Bauhinia purpurea); a wheel chair from the Descanso Gardens Guild; a new chain saw and a top for a motorized cart from the Los Angeles Camellia Council, Ltd.

SOUTH COAST BOTANIC GARDEN

ATTENDANCE

Attendance in this biennium was 40,905, an increase of approximately 90% over 1965-67.

1965-66	1966-67	1967-68	1968-69
9,701	12,026	19,334	21,571
21,727		40,905	

Until April 14, 1968, the garden was open to the public one day a week; following that date it was opened four days a week, Thursday through Sunday, the present public schedule.

MAJOR PROJECT

Following installation of recirculating pumps, the water system of the 2½-acre lake and stream was tested and given operational clearance. 3,700 shrubs and trees were planted around the lake area; 4,800 rooted cuttings of 12 different ground covers were planted on slopes and above the headwall for erosion control. These ground covers will be studied and evaluated for their effectiveness during periods of heavy rain.

Work on this lake and stream was started during the previous biennial period. When finally completed, lake, stream, and surrounding plantings will stand as an outstanding example of county government's efforts to reclaim land — in this case, a dumpsite — for public benefit. In addition to the esthetic enjoyment it will provide, the area will serve as a bird sanctuary, as an outdoor laboratory for horticultural research, and perhaps most important of all, as a kind of living lesson in ecology for thousands of visitors and students.

Chrysanthemum frutescens, *marguerite 'Palos Verdes,' introduced by South Coast Botanic Garden to the nursery trade in this biennium.*

GROUNDS MAINTENANCE

Grounds maintenance poses special problems at this garden owing to the decomposition of material beneath the ground and consequent high heat, in a few areas reaching as high as 117°. Fissures and settling result in broken pipe and the loss of some plants. To some extent these losses are offset by the lessons learned in making repairs and developing counter measures to minimize settling and the drying and cracking of soil.

GROUND DEVELOPMENT

Maintenance problems indicated in the foregoing paragraph prompted the updating of the sprinkler system. East and west systems were joined in order to provide more adequate pressure and eveness of flow for the eastern acreage and, also, to meet the growing demands of the garden as a whole. Extensions of the system in the west acres were installed in two previously waterless sections in order to protect some fine specimens and old plants and to keep ground covers constantly fed and watered for deep rooting to hold the soil on the 2-I slope.

The problems caused by runoff were eased by the installation between October, 1967 and October, 1968 of 6,000 feet of drainage pipes and ditches.

It should be noted that garden club volunteers contributed significantly to this work. Without their dedicated help the garden might have suffered severe damage during the rain runoffs.

The staff also built a 1,200 square foot lath house; a saran shade house for Youth Education; 680 feet of fenced compound for supplies; and various storage areas.

COLLECTIONS

Plant collections now embrace 350 cacti; 100 natives; 500 flowering fruit trees; 48 acacias; 28 palms; 32 ficus; 59 eucalyptus; plus pines, bottle brushes, many legumes, rose family members, ground covers, and bromeliads.

WEATHER

In the spring of 1968 the garden became an accredited United States Government Weather Station, reporting its readings to the Los Angeles County Flood Control District. Newspapers in the area have also availed themselves of these reports.

A severe freeze in December, 1968, with 13 nights under 32° (the lowest 22°), followed by a rainfall four times normal, resulted in an estimated $2,000 loss in plants and labor costs for the repair of damage throughout the grounds. Some compensation was derived from the luxuriant blooms on thousands of trees and shrubs the following spring, the result of the heavy rains.

VOLUNTEERS

Under the guidance of Mrs. Eugene Hillman of the South Coast Botanic Garden Foundation, volunteers continued to serve as hosts to visitors on Thursdays and Fridays.

Volunteer propagators donated over 1,680 hours in two years to help root some 7,000 cuttings, potting and canning over 6,000 seedlings, and collecting thousands of seeds from existing plants.

ANNUAL EVENTS

Arbor Day, March 7

Fiesta de Flores (Flower Show), June 7 – 9.

Four lectures sponsored each year by the South Coast Botanic Garden Foundation.

EDUCATION

YOUTH

Youth education activity is divided into two parts: workshops and field trips. The workshops consist of year round classes concerned with plants, gardening, nature, and art. They are held outside regular school hours and are intended as an enriching, extracurricular experience.

School field trips are scheduled in cooperation with school districts; they are conducted during school hours by staff tour guides and trained volunteers. They serve as an educational experience for teachers as well as for students in the elementary grades. Plant science, Nature and Conservation, and the History of the area are the basic subjects. Each year the staff youth education specialist, with the assistance and participation of staff tour guides, conducts seminars in modern teaching techniques under the direction of city and county curriculum specialists for the benefit of all field trip leaders.

WORKSHOPS

	ARBORETUM 1967-69	DECANSO 1967-69	SOUTH COAST 1967-69
School grades	1 through 9	1 through 9	1 through 9
Workshops	67	52	15
Students registered	783	610	337
Subjects	12	9	7
Cities represented	19	16	9

FIELD TRIPS

	ARBORETUM 1967-69	DESCANSO 1967-69	SOUTH COAST 1967-69
Trips	1,352 (968)*	407 (330)*	275 (94)*
Students	42,994 (33,674)*	14,171 (11,548)*	8,572 (2,942)*
Teachers	1,468 (1,061)*	446 (514)*	285 (121)*
Cities	97 (29)*	63 (350)*	30 (15)*

*Numbers in parentheses are for 1965-67

Arbor Day, March 7: Annual event commemorating the birthday of Luther Burbank and National Conservation Week.

1968

Arboretum — The program was rained out this year, but 650 tree seedlings (***Chorisia speciosa***) were given to the East Los Angeles Junior High School to assist in the school's beautification program.

Descanso — Also rained out, but 800 tree seedlings, also (***Chorisia speciosa***), were given to students on school field trips.

South Coast — 651 Incense Cedar (***Calocedrus decurrens***) given to children attending Arbor Day program.

1969

Arboretum — Aleppo Pine (***P. halepensis***) seedlings were given to 1,600 children attending ceremony.

Descanso — Aleppo Pine seedlings were given to 1,250 children attending ceremony.

South Coast — Aleppo Pine seedlings were given to 800 children attending ceremony.

ADULT

Class program expanded as part of a cooperative two-year curriculum resulting in 26 classes in 18 subjects for the 1969 fall semester.

New in-service education program developed for those employed in the horticultural industry.

Multiple guest-instructor approach used successfully for many courses.

New programs started at South Coast Botanic Garden. Daytime courses started at all sites in many subjects augmenting night offerings.

Student projects organized with Pasadena City College, Cal State Los Angeles, and Dominguez, Pasadena and Monrovia High Schools, and Office of Economic Opportunity.

Special field study trips conducted with local colleges.

GRAPHIC ARTS

Series of publications, brochures, leaflets and related illustrative material produced for all types of department programs.

Exhibits program developed at all sites.

HISTORICAL SECTION

New headquarters, work, and exhibit center established in Coach Barn from a previously unused area.

New day and evening adult education classes established in California History at Arboretum and Descanso.

Young Historians organized as an active volunteer service.

Adult and youth group volunteers organized and working in all phases of the program.

LIBRARY

Catalogued holdings in the LASCA library increased in this biennium from 16,329 to 27,000. Currently received periodicals increased from 350 to 400.

In addition to the five 16mm motion picture films available for lending, the library is now able to offer 12 half-hour television programs covering the facilities of the department and presented as a cooperative public service venture by KNBC and the Atlantic-Richfield Company.

PUBLIC SERVICE

A section was created for four staff members with programs in turfgrass, botanical and horticultural consultation, plant propagation, erosion and slope stabilization.

Turfgrass management leaflet was developed and widely distributed. Operation Green Carpet program exhibits were made at functions. A weekly lawn care clinic was developed, turfgrass institutes held with outstanding participants. Turfgrass Advisory Committee was organized.

PUBLIC INFORMATION

In April, 1968, the Information Section was reorganized as a separate Public Information Division with responsibilities at all three sites. The new setup is a reflection of the growth of public information services within the Department.

A new function assumed by the Tour Guide Section of the PID was the scheduling of school field trips at the Arboretum and Descanso Gardens, a move that made for greater efficiency inasmuch as the PID was already scheduling staff and volunteer tour guides for these trips and was working closely with the staff Youth Education Specialist and curriculum specialists from the Los Angeles City Schools and the office of the L. A. County Superintendent of Schools in developing course material for field trips and in planning and conducting workshops and seminars in modern teaching techniques for guides.

The number of public tram tours at the Arboretum and Descanso Gardens increased by nearly 3,000 in this biennium, despite an unusually high number of rainy days that prohibited the operation of trams.

At South Coast Botanic Garden the addition of a full-time tour guide in August, 1968, followed by the granting of 115 days a year for "as needed" guides — used mainly on weekends — made possible services to the public that, in turn, contributed to the growing attendance. These services are: giving general information on the garden and its activities; answering or referring horticultural questions; giving tours to garden clubs, youth organizations, senior citizens, and the general public; maintaining live plant and other exhibits; organizing volunteer activities; cooperating with the Audubon Society in the study and listing of birds observed within the garden.

A major part of PID work is directed toward extending public understanding of the actual and potential role of arboreta and botanic gardens in the social scheme. This is principally accomplished through publications like the quarterly magazine, Lasca Leaves, the Biennial Report, feature stories for newspapers, trade journals, and television, and through publicizing such Departmental activities as research projects, education programs, events, horticultural attractions, and services.

*A highlight of PID work in this biennium was a series of news stories inviting a public search for a rare tree (*Camptotheca acuminata*) containing a drug showing promise in the treatment of cancer. The PID initiated the search after it became known that the U.S. Department of Agriculture and the National Cancer Institute were in need of mature specimens for a critical stage of laboratory tests. The stories were disseminated by national and international news services and by the U.S. Information Service overseas broadcasts. They resulted in over 2,500 tree samples being sent in to the Arboretum for identification, the location of two trees, and attention to the role a botanic garden can play in efforts to solve medical as well as environmental problems.*

RESEARCH

CAMELLIA

Breeding activities in camellia have yielded a number of papers in the American Camellia Society Yearbooks. These activities have been carried out in cooperation with a number of scientific societies and individual specialists.

Goals of this project include development of superior plants which have new or improved flower colors, fragrance, cold-hardiness, improved plant habit, and sun tolerance. A number of plants have been produced since the project commenced in 1961 and several show sufficient promise for release to the general public in the near future. Basic genetic studies of the genus include flower color and form inheritance, species interrelationships, and self-incompatibility reactions.

HIBISCUS

Beginning in August 1968 the hibiscus project has been gradually transferred from research associates Ross Gast and Joseph Staniford to George P. Hanson, staff geneticist. The project includes the breeding observation, testing, and selection of hibiscus hybrids, followed by release of plant materials and publication of resultant information. During the past two years three excellent varieties with superior qualities have been released to commercial growers and numerous publications have been prepared by Mr. Gast (copies of which may be found in the Arboretum library).

Other projects currently under way include: 1) collection of hibiscus species from all over the world and a detailed study of their interrelationships and potential for the breeding program, 2) improvement of general plant habit including resistance to cold wet winters, increased length of time a flower remains open, and introduction of fragrance, and 3) basic genetic studies into the inheritance of flower color and form, plant habit, leaf shape, rooting ability, flowering response, and self-incompatibility.

AIR POLLUTION

Many plant species show varying degrees of susceptibility to smog. The aim of one genetic air pollution study is to investigate the degree of resistance that can be developed in susceptible species of ornamental plants and to understand the inheritance of such resistance and the biochemical or biophysical basis by which tolerant varieties resist smog injury. Cooperating in this study is Bodger Seed Company located at Chino, California. They have provided seeds of several varieties of petunias for testing which their initial studies have shown to differ in smog susceptibility. Our tests have verified their ratings and we are currently making crosses between various varieties, analyzing progeny for smog tolerance, investigating the biochemical changes induced by the smog in those varieties, and determining the biochemical differences between the tolerant and susceptible varieties.

FIRE-RETARDANT PLANTS

During the period covered by this report, emphasis in the fire-retardant plant research project has been centered on the basic question of why some plants do not burn as readily as the Southern California chaparral shrubs of well-known high flammability. The information obtained will greatly strengthen future recommendations for fuelbreak planting to aid in wildfire control and for home landscaping to minimize the brush fire hazard.

Experiments conducted in the laboratory have dealt primarily with the nature of fire retardance in ***Cistus*** (rockrose) and ***Atriplex*** (saltbush) as indicated by muffle furnace burning tests. The role of moisture content and physical characteristics (such as leaf thickness) in flammability was intensively studied. Preliminary work also was carried out to determine the effect of plant chemical components on burning. Saltbushes have a relatively high leaf moisture content, thus making them more difficult to burn than, for example, scrub oak which has a much lower moisture content. A few ***Cistus*** species were found to have thick, leathery leaves which increase the length of time required for them to begin burning.[5]

Seeds of ***Cistus*** and ***Atriplex*** species were obtained from various sources around the world. The resulting plants are being established in a test plot on the Arboretum grounds. These collections will make possible the study of differences in flammability between species. In addition they will form the nucleus of a breeding program to develop new varieties with greater fire retardance, prostrate growth habit, increased drought and frost tolerance.

Since 1954, more than 75 plots of fire-retardant plants, primarily involving species of ***Cistus*** and ***Atriplex***, have been established in the foothills of the San Gabriel, Santa Monica and San Bernardino Mountains to learn if the plants can survive and reproduce under the harsh environmental conditions found in these areas. Collection of field data has been intensified during the past year.

ROOTING RESPONSES OF WOODY PLANT CUTTINGS

The standard method of propagating plant stem cuttings involves inserting the end of the cutting to be rooted into an opaque medium such as coarse sand or perlite (sponge rock). However, with media of this type it is not possible to study the quantitative effects of various chemicals on the formation of roots. Studies were initiated to overcome this problem and ultimately to facilitate the propagation of many species now considered difficult to root from cuttings.

Uniform cuttings of cotton (***Gossypium hirsutum***) are rooted in small vials filled with 1% agar in water. To this basic medium known amounts of growth substances or other chemicals can be added. The cuttings are rooted under continuous light in glass-topped boxes at high humidity.

I. Studies on Oak root rot fungus (*Armillaria mellea*)

Trials have been made this past year, with the help of high school science project students, to compare the degrees of resistance among our native and introduced woody ornamental plants against ***Armillaria*** infection. Branches of various woody species inside test tubes were inoculated with fungus culture under sterile condition. Growth patterns of the fungus on different tested branches were then compared and classified. Even though the majority of woody species tested are highly susceptible, some species expressed consistent resistance. Program at the present involves the using of rootlets, and four different strains of ***Armillaria*** are used for comparison. It is hoped that positive correlation between test tube assay and field resistance can be obtained.

In the past year a bacterial isolate, tentatively identified as a strain of ***Bacillus subtilis***, was obtained from contaminated culture. This bacterial isolate, when grown on artificial medium (potato dextrose broth or agar) produces strong antifungal substance inhibitory to the growth of several common plant pathogenic fungi including the Oak root rot fungus (***Armillaria mellea***)[1] as shown in the picture (opposite). This antifungal substance is soluble in water and ethyl alcohol but insoluble in ethyl ether. It is heat stable, resistant to acid, and it can be purified by means of dialysis against water. Furthermore this substance inhibits the sporulation of ***Colletotrichum gloeosporoides*** (fungus causing anthracuose disease of plants) and causes abnormal hyphol growth of ***Alternaria solani*** (fungus causing early blight of tomato and potato).

II. Plant Viruses Studies

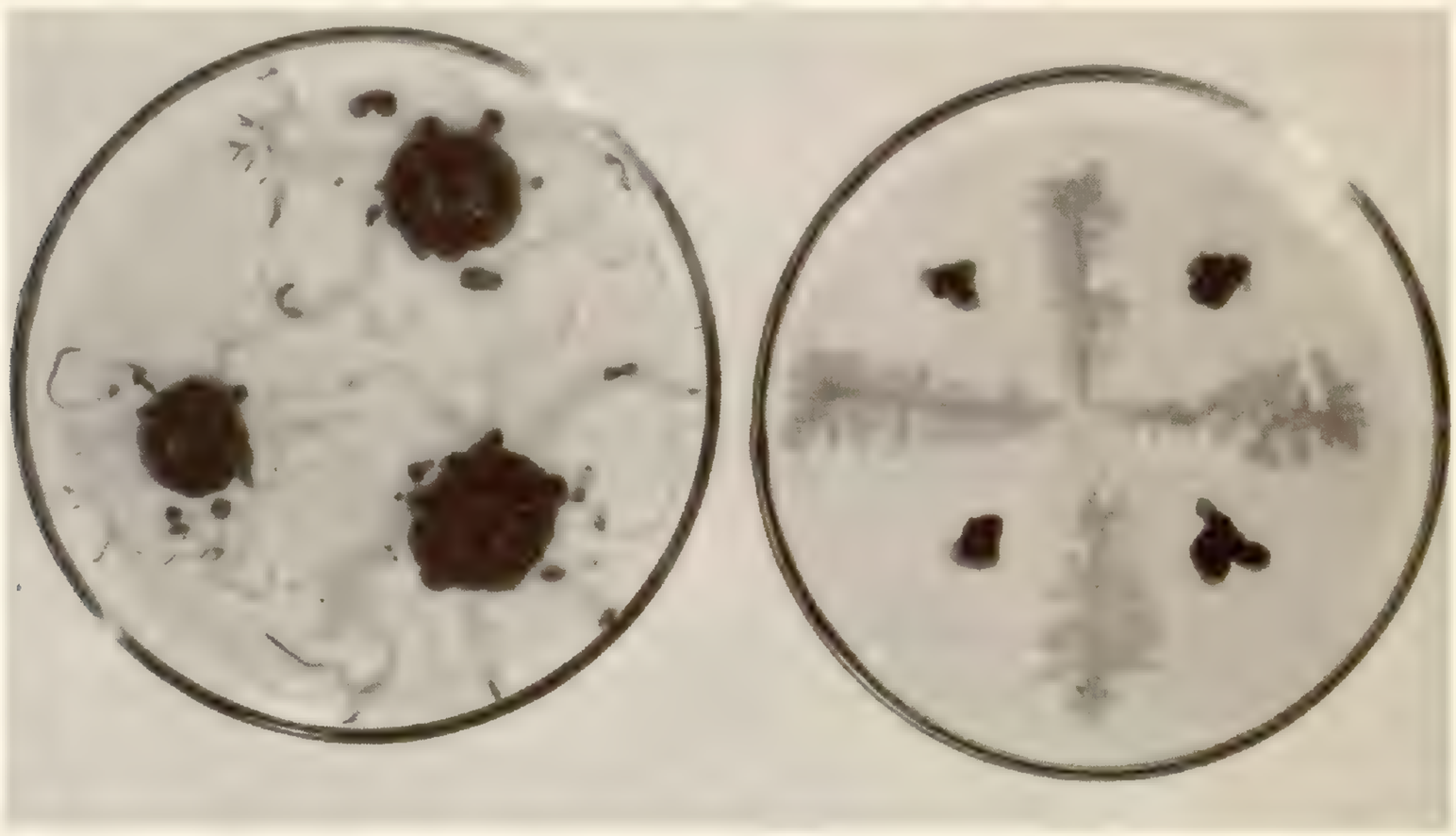
A. The effect of 2,4-dichlorophenoxyacetic acid (2,4-D) on tobacco mosaic virus (TMV)[2] was studied. 2,4-D is widely used as an agricultural herbicide. When it is applied to the plant, it accelerates the nucleic acid metabolism of the plant to the extent of exhaustion in some sensitive plants resulting in their eventual death. When cucumber seedlings are pre-treated with 2,4-D, they become more susceptible to TMV infection. When plants were treated with 2,4-D after TMV infection, as in the case of ***Physalis floridana***, significantly more virus particles are produced than control plants. The effects of increasing susceptibility and virus production are not due to the accumulation of nitrate resulting from 2,4-D application.

B. Studies on Plant Resistance Against Virus Infection

Tobacco mosaic virus (TMV) is capable of infecting many species of plants. Among these host plants there is a wide range of difference in degree of resistance to virus infection. It is generally believed that resistance of plants to TMV is represented by a local lesion reaction as compared with the recognized susceptible reaction of mottling and mosaic involving the systemic spread of virus. Subliminal infection of many plant species with TMV has not been investigated in the past. Cotton, for instance, was reported to be insusceptible to TMV infection. However, by means of TMV purification procedure using large amounts of infected tissue actual TMV biosynthesis in the cotton

plants was demonstrated even though the amount of TMV produced was only 1/200,000th of that from a readily susceptible host such as ***Physalis floridana.*** Therefore, many plant species, ornamental plants as well, reported as 'insusceptible' in the literature are subliminally infected to varying degree.

Senescence in cotton (resulting from detached leaf culture in dark) promotes TMV biosynthesis to the extent of 100-fold. The senescence treatment can thus magnify the infection. In cotton, also, TMV content declined and eventually reduced to zero in a time course study. This would indicate an inactivation of TMV ***in vivo.*** Studies continue in the direction to substantiate the fact that strong antiviral response is responsible for the subliminal infection in plants. The isolation and characterization of such antiviral substance should offer a new challenge in the field of chemotherapy of virus infection. This project is supported by a National Science Foundation Grant in the amount of $23,600 for a two-year period starting March 1969 to 1971.[3,4]



LEFT: Eleventh day growth of **Armillaria mellea** *on potato dextrose agar.*

RIGHT: Same period of growth showing inhibitory effect by the bacterial culture.

HERBARIUM

In this biennium, 5,000 botanical and horticultural specimens were collected or otherwise added to LASCA Herbarium. Current total holdings of exsiccatae within the facility now exceed 35,000 sheets and supplementary reference collections. The specimen-exchange program has expanded and is now maintained with ten cooperating botanical institutions. Over 3,000 exchange sheets have been distributed; and many other specimens referred or readied for referral to specialists for consideration, or in response to specific requests. Exchange specimens received in return totaled approximately 2,200 sheets; these were provided by the Arnold Arboretum (Harvard University), Bailey Hortorium (Cornell University), Barnes Arboretum, California Academy of Sciences, Fairchild Tropical Garden, Morris Arboretum (University of Pennsylvania), San Diego Natural History Museum, University of California and the U. S. National Arboretum.

Effort is being continued to expand these exchange arrangements to other institutions of comparable interest, both foreign and domestic. Several hundred herbarium sheets were secured on loan from or consulted within five other herbaria. These represented particular collections pertinent to collaborative study of the Myoporaceae in domestic cultivation. This research, now nearing completion, has also involved extensive correspondence and fieldwork on *Myoporum.*

The standing program of field trips for collection of representative woody ornamentals under cultivation throughout Southern California consisted mainly of repeated, brief excursions along the coastal region from San Luis Obispo County southwards. Particular emphasis has been made in recent, extended fieldwork and contacts within San Diego County.

LASCA Herbarium has been fortunate in securing significant volunteer assistance towards facility development. Such voluntary staffing supplementation in this biennium has totaled twelve preparatorial and clerical assistants and two professional collaborators. Additionally, budgeted staffing of the Herbarium was expanded in the past year to provide for a biology assistant. As a consequence of this staff and volunteer assistance, the tremendous backlog of accumulated raw collections is finally receiving the prerequisite botanical attention.

PLANT RECORDS UNIT

The Plant Records Unit consists of a plant recorder, assistant plant recorder and clerical help. It is responsible for accessioning and for recording the history, cultural data, nomenclature and disposition of all plant or seed acquisitions arriving at or leaving the Arboretum. The unit is also responsible for receiving, cleaning, packaging, storing and issuing of seed used for planting at the Arboretum, and for preparing seed for exchange with other arboreta and botanic gardens throughout the world.

SEED AND PLANT CONTROL STATISTICS

	1967-8	1968-9
Accessions	1,366	1,335
Seed planted	984	1,294
Cuttings inserted	15,448	10,694
Plants into one-gallon cans	2,858	1,439
Plants moved to permanent field location	1,567	1,518
Identification labels made	4,882	3,670

At the time of this report there are at the Arboretum approximately 6,697 accessions, 170 families, 1,472 genera, 4,359 species, and 1,569 varieties of plants in the field.

The seed exchange program with foreign botanic gardens has increased in this biennium from 399 to 401. The two added botanic gardens are of great importance to the Arboretum; after trying for a long time to establish contact with a botanic garden in India, seed was finally exchanged in 1969 with the Lucknow Botanic Garden. Of equal importance was the establishing of cordial relations with the botanic garden of the Universidad de la Habana, especially since contacts with Central and South American gardens remain limited. 5,519 packages of seed were sent, and 2,378 received from botanic gardens in almost all parts of the world, including 42 Soviet republics; Nova Lisboa, Angola; Jardin D'Essais du Hamma; Algeria; and Ibadan, Nigeria.

WEATHER

Daily reading of temperature, rainfall, water evaporation and relative humidity are recorded and forwarded monthly to the Los Angeles County Flood Control District from the Arboretum Weather Station No. 1037-E. In addition, from November 15 to February 20 of each year the Arboretum sends to the United States Weather Bureau Frost-Warning Service in Pomona, daily information from which is determined possible frost for the western San Gabriel Valley. Weather data is referred to and used by the Arboretum staff, Education Division (school weather tours), Smog Control Unit, and many newspapers and water departments in the area.

Weather data for the two year period:

	1967-8	1968-9
Lowest temperature	32° – Dec. 20, 1967	28° – Dec. 21, 1968
Highest temperature	109° – Aug. 30, 1967	101° – Sept. 9, 1968
Total days of rainfall	33 days	56 days
Heaviest monthly rainfall	November – 5.36 in.	January – 20.49 in.

Of particular interest was the violence and destructiveness of the rain storms of January-February, 1969. The period January 19-28 is almost unparalleled in uninterrupted downpour – ten solid days; during this interim a 20-year record was broken when 7.16 inches fell during the 24 hours of January 25. The month closed with a 20-year record of 20.49 inches of rain. The respite was only temporary. On the night of February 5, 1969, hailstones the size of walnuts broke 200 glass panes in the main greenhouse. The next storm started on February 18 with thunder, lightning, hail, and snow in the mountains followed by nine days of rain which, added to other, isolated rains during the month, produced 13.42 inches, another 20-year record. In spite of the damage throughout the southland, the Arboretum came through relatively unscathed.

ENTOMOLOGY

The entomologist continued to serve the friends and clients of the Arboretum by answering questions on problems dealing with the biology and control of insects and mites.

The project dealing with aphids and their host plants and host range at the Arboretum has been continued, with Dr. M. D. Leonard being responsible for the identification of the aphids and Dr. Leonid Enari for the identification of the host plants.

Aphids have been collected from 2,684 different host plants. It might be interesting to note that aphids were collected from only 111 of these hosts during each of the four years of the survey. This does not necessarily mean that aphids were not present on some of the other hosts during each year, but that they were not found on the dates collections were made, as it took from three to four months to complete a survey of all of the 4 to 5,000 species of plants on the 127 acres of the Arboretum grounds. Aphids were collected from 70 additional host plants during each of the years 1966, 1967, and 1968.

Preliminary reports indicate that of the 100 species of aphids that have been collected, three have not yet been described, and the host range of many of the aphids has been greatly expanded.

In addition to the aphid project, a similar project has been started on white flies, with the cooperation of Dr. Leonid Enari for the identification of the plants, Dr. Louise M. Russell for the identification of the white flies, and with the volunteer help of Mrs. Hensley, Mrs. Higley and Miss Knudsen, who have been preparing slides of the white flies for identification.

Three papers, one on beneficial insects, one on systemic insecticides and one on aphids have been prepared and published during the biennium. In addition, the entomologist cooperated with the county entomologists in the preparation of leaflets on the control of about 20 major insect pests of interest to local home owners for distribution by all Los Angeles County offices. [6, 7, 8]

PUBLICATIONS:

1 CHEO, P. C. Control of ***Armillaria mellea*** with systemic chemicals. Plant Disease Reporter 52: 639-641. 1968.

2 CHEO, P. C. Effect of 2,4-Dichlorophenoxyacetic Acid on Tobacco Mosaic Virus Infection. PHYTOPATHOLOGY 59: 243-244 1969.

3 CHEO, P. C., et al. Effect of Foreign RNA on Tobacco Mosaic Virus Local Lesion Formation Virology 35: 82-86 1968.

4 CHEO, P. C., Subliminal Infection of Cotton (***Gossypium hirsutum***) by Tobacco Mosaic Virus Accepted for publication in PHYTOPATHOLOGY.

5 MONTGOMERY, KENNETH R. and P. C. CHEO. Moisture and Salt Effects on Fire Retardance in Plants. Accepted for publication in American Journal of Botany.

6 WALKER, HARRY G., 1967. Those Beneficial Insects. LASCA Leaves. 17(2): 38-40.

7 WALKER, HARRY G., 1968. Systemic Pesticides. The Camellia Review. 29(5): 19 and 32.

8 WALKER, HARRY G., MORTIMER D. LEONARD and LEONID ENARI, 1969. Aphid Investigations at the Los Angeles State and County Arboretum, LASCA Leaves, 19(2): 28-31.

AFFILIATED FOUNDATIONS

CALIFORNIA ARBORETUM FOUNDATION, INC.

The California Arboretum Foundation, Inc. is governed by a Board of Trustees consisting of twenty-five Foundations members elected for a three-year term. The membership roster totals 752.

AFFILIATED VOLUNTEERS

Las Voluntarias: a self-governing organization of private citizens whose efforts make possible the extension of many Arboretum public services. Organized in this biennium, membership has grown from an original 18 to 96. The ladies of Las Voluntarias serve primarily as school field trip leaders, but assist also in Foundation activities as well as in the Research, Pub4ic Information and Education Divisions.

Los Ayudantes: the junior division of Las Voluntarias whose 25 teenage members have contributed significantly to Arboretum and Foundation functions.

Southern California Unit of the Herb Society of America: has in this biennial period increased the number and variety of plantings and generally improved the

Arboretum Herb Garden which it established 20 years ago. Its members have also assisted the development of the adjoining Braille Terrace, cultivating the fragrance garden so that the blind may be able to touch, smell, and thereby "see" the beauties of nature.

EDUCATION

As in previous years, the Foundation sponsored two spring and fall classes for adults: Flower Arrangement; Sketching and Water Colors.

PEACOCK PAVILION

This building houses the Gift and Book Shop, Foundation offices and Snack Bar. A staff of four and an executive secretary operate the gift shop and business offices. The Gift and Book Shop has an inventory of 700 items.

Listed below are the major contributions to the Arboretum made by the Foundation during the past two years:

1. Funds for perpetuation of the Arboretum Historical Section $693
2. Funds for trees and Arbor Day ceremonies $1,177
3. Funds for sound film "Green Leaves" $2,100
4. Funds for Fragrance Garden Braille Terrace $273
5. Matching funds with Sunset Magazine for plantings in Home Demonstration Gardens $600
6. Funds for Youth Education Division $4,838
7. Plaques installed in Peacock Pavilion patio and building $606
8. Memorial funds for trees $200
9. Peacock Pavilion Building furnishings $3,515
10. Santa Anita Depot furnishings $1,411
11. Harry J. Bauer Memorial Fund $10,000
12. Purchase of Clark Tractor for tram and maintenance $3,231
13. Purchase of rare books for Arboretum library $1,736
14. Publication of a quarterly, "LASCA Leaves" for distribution to members, botanical gardens, educational institutions, and government agencies.

15. Grant Awards for research from:

    a. National Institutes of Health. Amount: $11,373. Project: "Air Pollution Effects on Plant Tissue."

    b. National Science Foundation. Amount: $4,000 on a two-year grant of $23,600. Project: "Subliminal Infection and Inactivation 'In Vivo' of Tobacco with Mosaic Virus".

A major function of the Foundation is to administer reserve funds donated by members and friends. A portion of these include funds for the Santa Anita Depot, Daytime Home Garden classes, The Herb Society, Las Voluntarias, Foundation-sponsored classes, and the Flowering Booklets co-published with the Los Angeles Beautiful and Southern California Horticultural Institute.

DESCANSO GARDENS GUILD, INC.

The Descanso Gardens Guild, Inc., is governed by a Board of Trustees consisting of twenty-five Guild members holding office on a rotating basis.

In terms of capital and permanent improvements for the gardens, Descanso Gardens Guild contributed over $10,000 in this biennium. Principal expenditures were for landscaping and a new approach to the Tea House area; a new door in the Hospitality House to provide more flexibility and circulation for flower exhibits and large groups; a feed shed in the Bird Observation area; improvements in the Handicapped Children's Gardening area utilizing Guild-provided equipment, tools, and shed.

Over $1,000 was spent for equipment necessary to bring electrical power and a gas line into the gardens for the Guild-sponsored Festival of Lights and Fountains, held in alternate years.

VOLUNTEERS

Approximately 55,000 volunteer hours were given to the various activities of the Guild, principally to the staffing of the post card counter and the hostessing of the Christmas, daffodil, bonsai, and chrysanthemum shows.

Guild docents gave approximately 100 tours to 3,000 children and also served as teaching-assistants in summer classes. Eighteen trained docents assist staff tour guides in conducting nature tours for children of the Los Angeles Unified School District.

A Guild-sponsored program for physically and mentally handicapped children has served approximately 1,000 children from the Roosevelt School in Pasadena and the Home School and Columbus School in Glendale, supplying volunteer guides and paying for bus transportation from the schools to the gardens in the amount of approximately $600 per year.

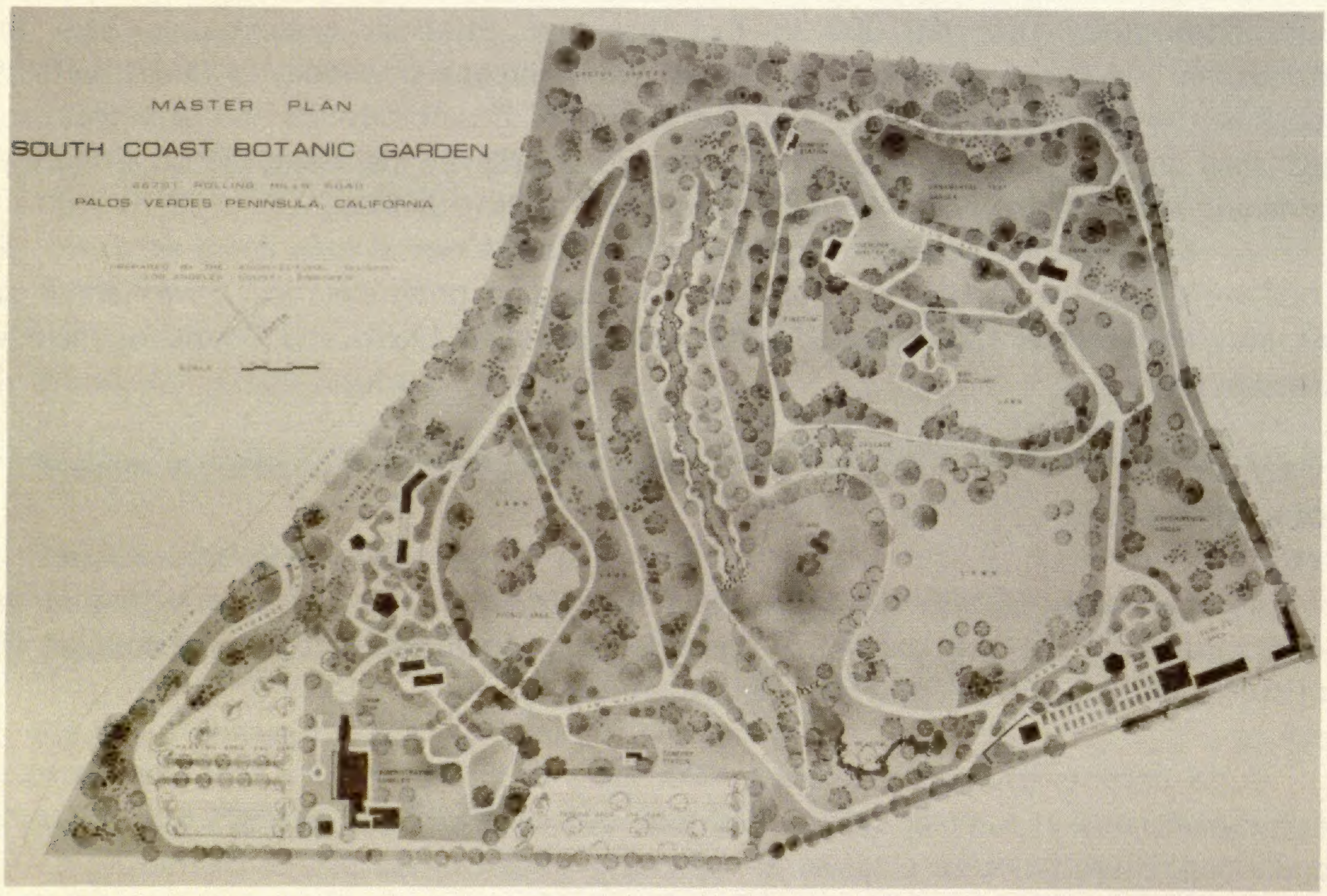
SOUTH COAST BOTANIC GARDEN FOUNDATION, INC.

After eight years of dedicated service, Mrs. Frances Young, founder and president of the Foundation since its incorporation in June 1961, retired on April 18, 1969. Mr. R. Glen Mackenzie, a longtime member of the Foundation's Board of Trustees, was elected her successor.

VOLUNTEERS

Foundation Volunteer Aides broadened their scope of activity at the garden in this biennium. Among their diverse accomplishments has been the study of California native plants as preparation for comprehensive listings of those growing at South Coast and the conducting of tours; working with the Aududon Society to study and list birds in the garden; assisting propagators with potting plants for the Fiesta de Flores show; assisting the staff tour guide in a variety of clerical jobs, and in conducting public tours.

Although youth education classes have been conducted at the garden almost since its inception, adult classes in home gardening were offered on the grounds for the first time in the fall of 1968. The Foundation sponsors these adult courses in cooperation with the Education Division of the Department.



Some of the features shown in this master plan for SCBG have already been completed, notably the lake and stream. Next major step will be the construction of the buildings forming the administration complex and the construction of the new entrance off Crenshaw Boulevard.

FINANCIAL REPORT

1967 – 69

DEPARTMENTAL SUMMARY

1967 – 68

	APPROPRIATION	EXPENDITURE	BALANCE
Salaries and Wages	954,283	951,448	2,835
Services and Supplies	124,162	159,691	(-35,529)
Capital Outlay Equipment	23,020	22,306	714
Total Department	1,101,465	1,133,445	(-31,980)
Number of Budgeted Positions	133.3		

1968 – 69

Salaries and Wages	1,085,145	1,081,564	3,581
Services and Supplies	120,293	138,186	(-17,893)
Capital Outlay Equipment	28,760	22,078	6,682
Total Department	1,234,198	1,241,828	(-7,630)
Number of Budgeted Positions	142.8		